IN THE CLAIMS:

This listing of claims will replace all prior versions, and listing, of claims in the application.

Listing of the Claims:

1. (Previously presented) A phased array antenna system with adjustable electrical tilt and having an array of antenna elements, the system incorporating:
   a) a variable phase shifter for introducing a variable relative phase shift between first and second RF signals,
   b) splitting apparatus for dividing the relatively phase shifted first and second RF signals into component signals, and
   c) a signal combining network for forming vectorial combinations of the component signals to provide a respective drive signal for each individual antenna element with appropriate phasing relative to other drive signals such that the angle of electrical tilt of the array is adjustable in response to alteration of the variable relative phase shift introduced by the variable phase shifter.

2. (Original) A system according to Claim 1 having an odd number of antenna elements.

3. (Original) A system according to Claim 1 wherein the variable phase shifter is a first variable phase shifter and the system includes a second variable phase shifter arranged to phase shift a component signal which has been phase shifted by the first variable phase shifter, the second variable phase shifter providing a further component signal output for the signal combining and phase shifting network either directly or via one or more splitter/variable phase shifter combinations.

4. (Original) A system according to Claim 1 wherein the variable phase shifter is a one of a plurality of variable phase shifters, and the signal phase shifting and combining network

is arranged to produce antenna element drive signals from component signals some of which have passed through all the variable phase shifters and some of which have not.

5. (Original) A system according to Claim 1 wherein the splitting apparatus is arranged to divide a component signal into further component signals for input to the signal phase shifting and combining network.

6. (Original) A system according to Claim 1 wherein the signal phase shifting and combining network employs phase shifters and hybrid couplers (hybrids) for phase shifting and vectorially combining the component signals.

7. (Original) A system according to Claim 6 wherein the hybrids are 180 degree hybrids.

8. (Original) A system according to Claim 6 wherein the hybrids are ring hybrids with circumference $(n+1/2)\lambda$ and neighbouring ports separated by $\lambda/4$, where n is an integer and λ is a wavelength of RF signals in material of which each ring hybrid is constructed.

9. (Previously presented) A system according to Claim 8 wherein the splitting apparatus incorporates ring hybrids with circumference $(n+1/2)\lambda$ and neighbouring ports separated by $\lambda/4$, one input port of each splitting apparatus hybrid being terminated with a resistor equal to the system impedance and forming a matched load.

10. (Cancelled)

11. (Original) A system according to Claim 1 wherein the splitting apparatus, variable phase shifter, and the signal phase shifting and combining network are co-located with the antenna array as an antenna assembly, and the assembly has a single RF input power feeder from a remote source.

12. (Original) A system according to Claim 1 wherein the splitting apparatus incorporates first, second and third splitters, the first splitter is located with the variable phase shifter

remotely from the second and third splitters, and the second and third splitters, the signal phase shifting and combining network and the antenna array are co-located as an antenna assembly, and the assembly has dual RF input power feeders from a remote source at which the first splitter and variable phase shifter are located.

13. (Original) A system according to Claim 1 wherein the variable phase shifter is a first variable phase shifter connected in a transmit channel, and the system includes a second variable phase shifter connected in a receive channel and further transmit and receive channels providing fixed phase shifts, and the signal phase shifting and combining network is arranged to operate in both transmit and receive modes by producing antenna element drive signals in response to signals in the transmit channels and producing receive channel signals from signals developed by antenna elements operating in receive mode with independently adjustable electrical tilt in each mode.

14. (Original) A system according to Claim 1 wherein the variable phase shifter is one of a plurality of variable phase shifters associated with respective operators, and the system includes filtering and combining apparatus for routing signals on to common signal feed apparatus after phase shifting in respective variable phase shifters, the common signal feed apparatus being connected to splitting apparatus and a signal combining and phase shifting network for providing signals to the antenna containing contributions from each operator with independently adjustable electrical tilt.

15. (Previously presented) A system according to Claim 14 wherein the plurality of variable phase shifters comprises a respective pair of variable phase shifters associated with each operator, and the system has components to which have both forward and reverse signal processing capabilities such that the system is operative in transmit and receive modes with independently adjustable electrical tilt in each mode.

16. (Previously presented) A method of adjusting the electrical tilt of a phased array antenna system, the system including an array of antenna elements, the method comprising the steps of:

a) introducing a variable relative phase shift between a pair of first and second RF signals,

b) dividing the relatively phase shifted pair of first and second RF signals into component signals, and

c) vectorially combining and relatively phase shifting the component signals to provide to provide a respective drive signal for each individual antenna element with appropriate phasing relative to other drive signals such that the angle of electrical tilt of the array is adjustable in response to alteration of the variable relative phase shift.

17. (Original) A method according to Claim 16 wherein the array has an odd number of antenna elements.

18. (Original) A method according to Claim 16 including the step of generating at least one component signal which has undergone phase shifting in a plurality of variable phase shifters.

19. (Original) A method according to Claim 18 wherein the variable phase shifters are ganged, and the method includes producing antenna element drive signals from component signals some of which have passed through all the variable phase shifters, and some of which have not.

20. (Previously presented) A method according to Claim 16 including the step of dividing a component signal into further component signals for vectorially combining and relatively phase shifting.

21. (Original) A method according to Claim 16 employing phase shifters and hybrids for phase shifting and vectorially combining the component signals.

22. (Original) A method according to Claim 21 wherein the hybrids are 180 degree hybrids.

23. (Original) A method according to Claim 21 wherein the hybrids are ring hybrids with circumference $(n+1/2)\lambda$ and neighbouring input and output ports separated by $\lambda/4$, where n is an integer and λ is a wavelength of RF signals in material of which each ring hybrid is constructed.

24-25. (Cancelled)

26. (Original) A method according to Claim 16 including the step of feeding a single RF input signal from a remote source for splitting, variable phase shifting and vectorial combining in a network co-located with the antenna array to form an antenna assembly.

27. (Previously presented) A method according to Claim 16 including the step of feeding two RF input signals with variable phase relative to one another from a remote source to an antenna assembly and splitting, combining and phase shifting these RF signals in a network co-located with the antenna array.

28. (Previously presented) A method according to Claim 16 employing transmit and receive channels for operation in both transmit and receive modes, and including producing antenna element drive signals in response to transmit channel signals and producing receive channel signals from signals developed by antenna elements operating in receive mode with independently adjustable electrical tilt in each mode.

29. (Previously presented) A method according to Claim 16 wherein the variable phase shift is one of a plurality of variable phase shifts, the pair of first and second RF signals is one of a plurality of such pairs, and each variable phase shift and pair is associated with a respective operator, and the method includes:

a) filtering and combining signals and passing them to common signal feed apparatus after phase shifting in respective variable phase shifters for implementation of the steps of dividing, vectorially combining and relatively phase shifting;

b) providing signals to the array containing contributions from each operator; and

c) adjusting electrical tilt associated with each operator independently.

30. (Previously presented) A method according to Claim 29 wherein the plurality of variable phase shifts is implemented by a respective pair of variable phase shifters associated with each operator, the method employs components which have both forward and reverse signal processing capabilities, and the method includes operating in transmit and receive modes with independently adjustable electrical tilt in each mode.

31. (Previously presented) A system according to Claim 6 wherein the hybrids are designed to convert input signals I1 and I2 into vector sums and differences other than (I1+I2) and (I1-I2).

32. (Previously presented) A method according to Claim 21 wherein the hybrids are designed to convert input signals I1 and I2 into vector sums and differences other than (I1+I2) and (I1-I2).

33. (Previously presented) A method according to Claim 21 wherein the step of dividing the relatively phase shifted pair of first and second RF signals into component signals employs ring hybrids each having:

d) circumference $(n+1/2)\lambda$

e) neighbouring ports separated by $\lambda/4$, and

f) an input port terminated with a resistor equal to the system impedance and forming a matched load.